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THE SANITARY DRINKING FOUNTAIN[1]

By J. H. Dunlap

The abolishment of the common drinking cup has been a noteworthy achievement. Prohibited in the state of Kansas in 1904, the public cup is today a national outlaw. In October, 1911, the state board of health of Iowa adopted the following resolution:

> Whereas: It has been demonstrated that common drinking cups are frequently contaminated with disease-producing germs and, as a medium for the transmission of contagious and infectious diseases, they are a source of danger to the public health, and
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> Whereas: Individual or private drinking cups may readily be provided in such places where most needed, therefore,
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> Under the authority of the statute imposed upon the State Board of Health to promulgate rules and regulations relative to the preservation of the public health in contagious and infectious diseases, and the prevention of the same, the use of the common drinking cup in all public places such as parks, streets, schoolhouses, hotels, factories, workshops, libraries, railway stations and cars and all other public places, is hereby prohibited from and after January 1, 1912.

After the common cup had been removed, it was soon discovered that the expense and inconvenience of providing individuals with private drinking cups was considerable. Accordingly the modern sanitary drinking fountain has been developed and installed in large numbers.

Of course such fountains should be sanitary in fact as well as in name, and yet it is true that the most of them are little better than the old public cup. Recently the writer's attention was called to the dangers lurking in the apparent safety of the modern intermittent bubbling fountain by watching a patient at one of the largest hospitals of the state obtain his drink. The patient opened the valve with his hand just enough so that the bubble was of such a height that he could surround the metal top of the bubbler with his lips and almost devour it while getting his drink. A year or more ago a federal inspector in the United States Public Health Service observed the use of a certain fountain. Upon one occasion forty-seven persons drank, and in almost every case the lips were placed upon the metal top of the bubbler. Of the forty-seven who used the fountain three appeared to be tubercular, and three had an eruption upon the face. Anyone who will take the trouble to make the rounds of the present bubbling fountains in his own city will have similar experiences.

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[1] Read October 10, 1916, before a joint meeting of the Illinois and Iowa Sections at Davenport, Iowa.

To corroborate his own opinion the writer sent out a few random inquiries to state boards of health. The following quotation from one reply is typical:

"It is our conviction from a superficial examination of several types of drinking fountains on the market that they are little better than the common drinking cup."

The so-called sanitary fountain is reprehensible for two reasons; first, it is constructed with too much confidence in the intelligence of the public; and second, it is made with too little attention to the laws of hydraulics. In the first place, then, it must be candidly admitted that even in this enlightened day the average man knows little about the modern science of bacteriology. In fact he knows usually only enough of bacteriolgy to joke at "germs" and "bugs." Illustrations of the prevailing ignorance are all too numerous. For instance, the high average case rate of typhoid in this country, the terrible ravages of tuberculosis, and the almost insane tactics adopted by one's neighbors in cases of small pox or infantile paralysis are only a few of the facts that force the conclusion that the elementary laws of public health are either unknown, or scorned and ignored by the masses. May not the remark be justified, in passing, that it is well nigh criminal that the public schools of the nation are allowed to be so detached from every-day life that its first principles are untaught?

Now it is due to this ignorance and criminal carelessness that the average individual in drinking from public fountains will not hesitate to adjust the height of the jet of water so that his lips may conveniently rest upon the metal of the bubbler. Furthermore if the bubbler is of the continuous flow type the ignorance and parsimonious thrift of the caretaker is apt to cause such a decrease in the height of the bubble as to make it impossible to drink without touching the metal top. In the face of such universal ignorance and carelessness no bubbler should be called sanitary, or allowed in a public place, which is so made that the lips may come in contact with it.

In the second place not only are these modern fountains constructed without regard to the defects of present-day human nature, but they are seemingly built without sufficient study of the laws of hydraulics involved. The superintendent of buildings for a large institution recently declared that he had been unable to find a bubbler which would work satisfactorily under the ordinary range of working pressures in the service pipes of buildings under his charge. It is often true that while a rush of people are using these fountains, the pressure in the service pipes decreases to such extent that in order to drink one must touch the metal part of the bubbler. Furthermore, in the case of intermittent fountains, the valves are so constructed that all who wish may open them to any size of jet desired. Accordingly if one prefers to drink with the lips touching the metal part of the fountain, it is entirely possible for him to do so. The valves should be so made and the regulating devices so designed that the jet will rise to such a height as to make contact with the metal impossible. Due to the practical impossibility of accomplishing this under all conditions an absolute essential of all drinking fountains is a guard so made that the lips cannot reach the metal top. One would suppose that these facts were sufficiently self-evident, and yet it is very surprising to find in a canvass of the catalogs of thirty-nine manufacturers that only six appreciate these elementary facts, that only six of these thirty-nine equip all their fountains with suitable guards.

Moreover, there is another law of hydraulics which recent researches show that all fountains now on the market violate. This is the law which one observes in action when one sees a ball dancing in the jet of a public fountain. The ball is held there by forces from which it cannot escape, and it will dance for an indefinite length of time in the jet. Now the jets from sanitary fountains are vertical. The question may be asked, what is to prevent bacteria, washed from the lips when drinking, from dancing in the jet until the next individual drinks? The latest experiments have shown that not only is this a possibility, but that it actually occurs. Furthermore it has been shown by actual experiment that the inside of the bubbler becomes at times heavily polluted by the bacteria from the mouth. This may easily happen in the intermittent type of fountain, for when the water is turned off, the bulb which forms the jet drains out, and accordingly the bacteria may follow the water as it subsides into the interior.

The experiments by which the sanitary fountain with the vertical jet has been discredited were made in the laboratory of medical bacteriology at the University of Wisconsin, and were published only last month.[2] The immediate cause for making these experiments was an epidemic of streptococcus tonsilitis, which occurred in the fall of 1914, in one of the women's dormitories at the University of Wisconsin. After 50 cases had occurred within a week's time an investigation was undertaken. It was found that the water pressure in this dormitory was so low that it was scarcely possible to drink from the bubbling fountains without touching the metal with the lips. A bacteriological examination of these fountains was made and they were found to be heavily contaminated. Streptococci were obtained not only from the surface of the fountain, but also from the inside of it, and from the water issuing from it. The city water supplying the fountains was proved to be free from these organisms. These surprising discoveries led to the investigation of all the other bubble fountains in the University. Forty-three out of 77 of them were found contaminated. A year later similar tests were made of 50 of these fountains and streptococci were found in 70 per cent. of them. As a result of these investigations the following eight conclusions were reached:[2]

1. During an epidemic of streptococcus tonsilitis in a woman's dormitory at the University of Wisconsin, streptococci were found in the bubble fountains in this building and in the water issuing from these fountains.
2. The city water supply was at the time, and has been, excellent in its sanitary character. It is obtained from the underlying Potsdam sandstone. No streptococci were found on a Berkefield filter through which water had been flowing continuously for one week.
3. Presumably the bubble fountains were a factor in transmitting the disease.
4. A survey of all the fountains of the University showed the presence of streptococci in over 50 per cent of the total number. The streptococci varied in abundance from a few chains to an almost pure culture obtained by swabbings from the fountains in the women's dormitory.

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[2] "The bacteriology of the bubble fountain," by Dorothy F. Pettibone, Franklin B. Bogart and Paul F. Clark, published in *Journal of Bacteriology*, September, 1916, vol. 1, no. 5, p. 471.

5. In an experimental bubble fountain, B. prodigiosus, when introduced either by means of a pipette or by the moistened lips, remained in the water from 2 to 135 minutes, depending partly on the height of the bubble.

6. Most of the organisms are flushed away but some remain dancing in the column much as a ball dances on the garden fountain, even though the bubble be increased to the impractical height of 4 inches.

7. To avoid the difficulty always present in the vertical column, a simple fountain with a tube at an angle of 50° from the vertical was constructed. B. prodigiosus was never found in the plates from this type of fountain even when samples were taken immediately after the introduction of the organisms.

8. We believe that this type of fountain should be generally adopted. Its simplicity, low cost of construction and freedom from lurking danger should recommend it to all.

In view of all the facts that have been presented it is believed that three recommendations should be made, as follows:

1. Public sentiment should be aroused to the dangers inherent in the modern drinking fountain. Laws should be passed and enforced requiring the approval of such fountains by state boards of health.

2. Public sentiment and the law should enforce the observance of the principles discussed, not only in the case of public drinking fountains, but also at soda fountains, etc. Is not this question reasonable, why should we be so particular in drinking water but not in drinking other beverages?

3. Since water works men have a good deal to do with the selection of public drinking fountains, it would seem wise that committees should be appointed by the local sections of the American Water Works Association to investigate the present situation and report.[3]

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[3] The following committee was appointed by the Iowa Section, J. H. Dunlap, Chairman, Dr. Henry Albert, J. J. Hinman, Jr.